VINTAGE TECHNOLOGY

History of computers, video games, calculators, radio, tv and audio in the digital age

Issue 3 : February 2008

Robots

Personal droids of the 80s

WALKMANS
first personal cassette players

LCD WATCHES
the evolution in keeping time

IAN GAMES
Doom and the birth of Ian Games

PLUS: The first pocket TVs ○ Magnavox Odyssey – the first home video game Cleaning old electrical equipment ○ Commodore calculators ○ Early computer viruses

Vintage Technology

WELCOME

It's a packed issue this month with lots of great features including pocket TVs, early walkmans and Commodore calculators. Don't forget to make a space in your diaries for end of March where there are two major vintage gaming and electronics/audio events in the USA.
If you have any money spare and have a few hours to kill (after you have read this magazine of course), check out some of the many modern TV game systems which play the old classics – full review inside.

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Atari Classics Evolved Ships For PSP

Atari, Inc , one of the worlds' most recognized brands anda third-party video game publisher, today announced that Atari Classics Evolved, a large compilation of classic Atari arcade games, has shipped to retailers in North America just in time for the holiday season. Atari Classics Evolved, rated E for Everyone, is available on the PSP (PlayStation Portable) system for a suggested retail price of $19.99.

Atari Classics Evolved features a full gamut of genre-defining classics like Battlezone, Centipede, Millipede, Missile Command, Tempest, Lunar Lander, Super Breakout, Warlord, Asteroids, Asteroids Deluxe and Pong. In addition to the 11 arcade classics, players can unlock more than 40 original Atari 2600 titles. These titles include such noted favorites as Yar's Revenge, Night Driver, Canyon Bomber and Crystal Castles among many others.

"Gamers today have gotten used to the increasing complexity of video games," said Todd Slepian, Producer, Atari, Inc. "But it's always nice to take a break from these monstrous titles and go back to the games that defined our childhoods. With so many fun classic games packed into such a small disc, it's hard not to crack a little smile for days gone by."

For true arcade authenticity, all 11 classic arcade titles in Atari Classics Evolved feature their original retro graphics, as well as an option for beautifully rendered "Evolved" graphics and enhanced gameplay. While retaining the tried-and-true gameplay of the original games, the 11 classic arcade titles also feature online leaderboards, allowing players to compare scores against some of the best players in the world. Some games also have local peer-to-peer wireless capability allowing players to compete in fierce local multiplayer matches.

For more information on Atari Classics Evolved, Atari and its entire product line-up please visit http://www.atari.com.

Netscape soon will be footnote in Web history

Netscape Navigator, the world's first commercial Web browser and the launch pad of the Internet boom, will be pulled off life support Feb. 1 after a 13-year run.

Its current caretakers, Time Warner Inc.'s AOL, decided to kill further development and technical support to focus on growing the company as an advertising business. Netscape's use dwindled with Microsoft Corp.'s entry into the browser business in the 1990s, and it all but faded away following the birth of its open-source cousin, Firefox.

"While internal groups within AOL have invested a great deal of time and energy in attempting to revive Netscape Navigator, these efforts have not been successful in gaining market share from Microsoft's Internet Explorer," Netscape director Tom Drapeau wrote in a blog entry Friday.

In recent years, Netscape has been little more than a repackaged version of the more popular Firefox, which commands about 10 percent of the Web browser market, with almost all of the rest going to Internet Explorer.

People will still be able to download and use the Netscape browser indefinitely, but AOL will stop releasing security and other updates on Feb. 1. Drapeau recommended that the small pool of Netscape users download Firefox instead.

A separate Netscape Web portal, which has had several incarnations in recent years, will continue to operate.

The World Wide Web was but

a few years old when in April 1993 a team at the University of Illinois' National Center for Supercomputing Applications released Mosaic, the first Web browser to integrate images and sound with words. Before Mosaic, access to the Internet and the Web was largely limited to text, with any graphics displayed in separate windows.

Andreessen and many of his university colleagues soon left to form a company tasked with commercializing the browser. The first version of Netscape came out in late 1994. Netscape fed the gold-rush atmosphere with a landmark initial public offering in August 1995. Netscape's stock carried a then-steep IPO price of $28 per share, a price that doubled on opening day to give the startup a $2 billion market value even though it had only $20 million in sales.

But Microsoft quickly won market share by giving away its Internet Explorer browser for free with its flagship Windows operating system. The bundling prompted a Justice Department antitrust lawsuit and later a settlement with Microsoft. Netscape eventually dropped fees for the software, but it was too late. Undone by IE, Netscape sold itself to AOL in early 1999.

Netscape spawned an open-source project called Mozilla. Mozilla released its standalone browser, Firefox, and Netscape was never able to regain its former footing.

Home computing pioneer honoured

One of the designers of the classic BBC Micro computer has been recognised in the New Year Honours list.

Steve Furber, of the University of Manchester, was made a Commander of the Order of the British Empire (CBE).

He was honoured for services to computer science, which included work as a designer at the UK computer firm Acorn, the makers of the BBC machine.
The scientist also helped design the ARM processor, a type of chip that dominates mobile electronics.
"I've been fortunate to be in the right place at the right time to do something interesting and have also been surrounded by very good people," he told BBC News.
During this time he was approached by Herman Hauser, co-founder of Acorn.
One of his first major projects was designing the unexpectedly successful BBC Micro, a machine designed to accompany a computer literacy programme set up by the Corporation.
"When the BBC first came talking about the contract their estimate was that maybe 12,000 would be sold," explained Professor Furber.

Ultimately, 1.5 million of the beige machines were sold.
But the success of the BBC Micro pales alongside the success of another product co-designed by Professor Furber.

ARM processors have become popular for portable electronics because of their efficient use of power.

Professor Furber is currently building a new type of computer using the popular processors. The Spinnaker project aims to mimic the complex interactions in the human brain. The machine, nicknamed the "brain box", is designed to eventually contain one million ARM processors. ■

The first computer viruses

It seemed that the first viruses were created by accident, through experiment, or at the most, as harmless pranks.

The concept of replicating programs was first mentioned in 1959 when British mathematician Lionel Penrose described automated self-replication in machines and how they could multiply, mutate and attack.

Viruses started to appear when mainframes and minicomputers were connected to networks in the 1970s. The Creeper virus was first detected on the ARPANET network and propagated via the TENEX operating system. It would display on screens the message "I'M THE CREEPER : CATCH ME IF YOU CAN". It was at this time that the first unofficial anti-virus program appeared in the form of the Reaper program which spread to these systems and deleted the Creeper virus. The Reaper virus may have been created deliberately to remove the Creeper virus but no one knows for sure yet.

The Rabbit virus also caused problems as it multiplied and spread to other machines, using up system resources and eventually crashing systems.

In 1975 the first Trojan appeared in the form of 'Pervading Animal' which was a guessing game to be played between the user and computer. The program copied versions of itself to all directories and eventually filled up the memory of the computer. It is possible that this problem was caused by an accidental bug in the program, but again no one really knows.

The first discovery of a 'worm is made in 1979 at the Xerox Palo Alto Research Center, but this did not get released into the wild.

Unsurprisingly, as more people used modems and made more use of BBS's and networks, more true viruses started to appear in the 1980s. This was also a time when people were starting to use floppy disks instead of cassettes for installing programs.

The first large-scale virus, the Elk Cloner, happened on the Apple II. By our standards it was relatively harmless and worked by copying itself to floppy disks, causing no damage to machines themselves. This virus was originally a joke, created by a high school student and put on to a game. The game was set to release the virus on the 50th time of starting the game. Only at this time, instead of playing the game, it would change to a blank screen that read a poem about the Elk Cloner.

The first definition of a virus was made in 1983 by Fred Cohen:

"a computer program that can affect other computer programs by modifying them in such a way as to include a (possibly evolved) copy of itself."

The first global virus, 'Brain', started infecting IBM PC compatible computers in 1986. Written by two Pakistani brothers who said they wanted to assess the levels of piracy in their software, the virus did no real damage to systems or data, so this was another case where the virus was an accident. At the same time the Virdem program was created by a German programmer which could add executable DOS files in the COM format. It is not known how much this virus was run though.

The next three years saw a lot more virus activity that attracted more media attention. In 1987 the Lehigh virus was one of the first to cause direct damage to data held on disk, but fortunately it never went into the wild.
The Suriv ('Virus' backwards) viruses could infect COM and EXE files and the Cascade virus caused symbols on the screen to fall down to the bottom line.

At the end of this year the Christmas Tree worm, first appearing in a German university, spread on VM/CMS-9 operating systems and then to IBM's Vnet network. The virus displayed a Christmas Tree on screen and sent copies of itself to other network users.

It was Cascade virus (the first encrypted virus) however that prompted IBM to produce a commercial anti-virus product. At this time it was difficult to provide effective anti-virus measures as there was no easy way for users to get regular updates to their software to keep pace with new virus threats. 'Immunizers' which could modify programs to trick a virus into thinking the computer was already infected were not very effective as the number of viruses increased into the hundreds. Fortunately UK programmer, Alan

Soloman, released Dr Soloman's Anti-Virus Toolkit, which was very successful.

One of the first hoax viruses was made in 1988. 'Mike Rochennel' sent a large number of messages to BBSs warning users to downgrade to 1200 baud modems as there was a virus that could transfer on the higher speed 2400 Baud modems.

One of the first truly damaging viruses was the Morris worm which infected and overloaded over hundreds of computer systems in the US (including the NASA research center). Morris exploited a vulnerability in the Unix operating system on the Vax and Sun Microsystem platforms, which caused $96 million worth of damage.

One of the first viruses created to obtain money was the Aid Information Diskette virus in 1989. 20,000 disks containing a Trojan, were sent to various addresses that had been stolen from the database of PC Business World. Once an infected disk has been loaded, the program would automatically install itself on the system, creating its own concealed files and directories and modifying system files. After 90 loads, the operating system encoded the names of all files, rendering them invisible and leaving only one file accessible. This file recommended paying money to a specified bank account. As a result, it was relatively easy to identify the Trojan's author, namely, Joseph Popp.

After he had run into the cascade virus, Russian Eugene Kaspersky devoted his time to founding the Kaspersky Lab that made anti-virus products. F-Prot, ThunderBYTE, and Norton Antivirus also sprang up at this time. It was also when the first antivirus newsletters were produced – UK based Sophos sponsored Virus Bulletin, and Dr. Solomon's founded Virus Fax International which eventually turned into Secure Computing. ■

Epson HX-20

The first laptop computer…

The Epson HX-20 was announced in November 1981 and sold widely in 1983 for between £400 and £500.
It was a great computer for the time and it's small size (1.6kg) was no bar to it's capabilities. Owners would have had good value for money.

The HX-20 used two Hitachi 6301 CPUs, had 16MB Ram (expandable to 32MB), and two ROM sockets that could be used to bring the total ROM to 48K.
There were 68 keys which included 5 function keys. The monochrome LCD screen displayed four lines of twenty characters but there was a "virtual" screen that showed up to 255 x 255 characters. The physical screen would be treated as a letterboxed window to this virtual screen, and could be moved around using the cursor, page up/down and home/end keys. A rotary view angle control on the left side could change the angle of the LCD elements of the view screen. A TV interface was available that could be used to display graphics in 4 colours.

Powered by 4 x NiCd AA batteries or an AC adapter, the HX-20 could run for up to 50 hours on batteries having had an eight hour charge time. Optional was the 1300 baud microcassette player on the front left of the computer. Tapes could hold 50KB of data and could be controlled either manually using the special function keys, or using program commands.

The mini printer on the front used rolls of 2.25 inch wide thermal paper, and could print roughly 17 characters per second or 42 lines per minute. A twin-5.25" floppy disk unit could be attached via the high-speed serial port. There was also an external cassette port, a barcode reader port, and an RS232 port.
Epson offered a modem, the CX-20, that could be used to connect to bulletin board systems of the day.

There didn't appear to be an over-abundance of software for the HX-20 – as evidenced by what remains today in auctions, flea markets and private sales. What did exist however seemed to cover the basic applications the HX-20 owner might need.

There were word processors – the best known being Ffoswriter; a spreadsheet – Epson Calc; games such as Attack ... from Outer Space! Awari, Lottery, Pong and chess; programming utilities such as 'Verify' which compared a binary file held on microcassette with the contents of the memory and 'Sideways printer' - which allowed 80 column by 16 lines printed sideways on the internal printer and Calendar.
The HX-20 was also used (or intended to be used) for specialised commercial applications such as telephone billing (recording the billing records from PABXs then converting to individual bills), weighing and label printing for dispensing of controlled substances in pharmacies and text to speech conversion for the blind.
The HX-20 was an interesting computer and while it never made it to the big league in terms of profits, it was key in influencing the creation of subsequent laptops, notably the TRS-80 Model 100 laptop which was a more popular computer. ■

Early computing predictions – how many came true?

How accurate were our predictions of the future of computing over the last few decades?

It seems that writers mostly overestimated how advanced technology would be at this time. Some predictions came true however.

Correct assumptions included the fact that as early as 1963 people predicted that there would be, in the future, a computer in every home.
In 1970 it was mentioned that computers in the future would get smaller and more reliable.

"They may become so small that they may fit into a brief-case or even our pockets".

At this time it was also predicted that in 1994 there would be the establishment of a "world computer-information bank" - more commonly known as the Internet.
Along this theme, in 1972 it was predicted in one source that by 1992 terminals in most homes and offices would be networked,

"people "shall be able to dial the computers and communicate with them. In office, shops, factories, and, probably, individual homes, there will be small machines designed to enable men to communicate with distant computers. We shall be able to ask them questions, to interrogate enormous banks of stored information, to perform calculations and to enter data that the computers will store, process, and act upon."

Some of the more incorrect assumptions about computing in the future centred on attributing computers with human-like characteristics, almost to the extent that they would replace a lot of what people currently do. This was written in 1963:

"Computers will analyse our aches and pains, and prescribe medicine to us. We might go to computers instead of doctors and dentists. Who knows? They may even develop a bedside manner."

In 1977 a survey carried out by Computer Weekly Magazine revealed that by 1994 computers would reduce the working week to only 20 hours.

It was common to assume that technology would only perform some of a particular task as opposed to the whole job. In this example from 1963 the writer describes the future of sending postal mail, but only thinks that part of this process can be done through technology as opposed to the whole process:

"Our post will be handled by computers. They will open our letters, scan them, and transmit the contents via satellite to the post office in the town to which we are writing, rewrite them, and seal the new envelope. A postman will then carry it to the addressee. Now being developed in America, this process is called speed mail...."

According to one writer in 1984, this was what communications of the future would be like:

"In one possible future world, there is no money. Everybody wears a wrist computer – like a broad bracelet, with a screen about 5cm square. This is linked by radio to orbiting satellites, which in turn connect up to the World Computer Complex. Your wrist computer functions as a telephone, television, and terminal. By calling up the World Library and talking to it, you can display the text of any book...(Nobody publishes books any more, of course: they just send tapes to the World Library). From anywhere in the world, you can talk to up to a dozen people simultaneously, with pictures, over the satellite link."

This example, whilst not strictly accurate (at least at the moment), embodies all of these general assumptions, namely, computers would get smaller, and people would have access to all kinds of knowledge on tap.

In 1982 it was believed that as office executives would not want to use a keyboard or operate a computer (he had secretaries to do this), they would use Videotex with a TV screen as this was simple to use. It was also anticipated at this time that the keyboard would die out and be replaced by speech synthesis.

The perception of the future of digital games was also slightly incorrect. This is a 1982 vision of what the game of chess would be like in the year 2000:

"...have one player with a chessboard fitted with a mini radio transmitter and receiver. The opponent, who could be hundreds of miles away, would

also have a chessboard like above. Each player could transmit moves to be received by the other player's board and shown up on the board's LCD display."

Ten years before this prediction, it was theorised that holograms would play a part in gaming:

"Coloured holograms have also been made, so it seems that, in the not too distant future, we may be able to sit in front of a `chess board' on which there are pieces the machine can `move'."

Perhaps this is the most startling claim made in 1968 by someone who thought there was to be no further progression in the world of computing:

"It seems to the author that the most spectacular applications of computers have now already been accomplished and that further progress will be fraught with difficulty, for once a computer is applied to activities other than simple arithmetic, it rapidly loses many of its advantages over a human operator"

It is funny to look back to the past to see what people believed might happen today, but we could certainly take lessons from this and not predict that events will happen as soon in the future as we think. ■

Vintage technology events

February 1st-3rd, 2008
Houston, Texas , USA: Houston Vintage Radio Association 29th annual conference, swapmeet, auctions & competitions
www.hvra.org

February 23rd, 2008
Williamsburg, Virginia, USA: Virginia Regional Telephone Show
http://www.atcaonline.com/events.html

March 14th-16th, 2008
Grapevine, Texas, USA: Texas Pinball Festival – play on and buy classic video games and pinball machines.
http://www.texaspinball.com/overview.htm

March 20th-22nd, 2008
Charlotte, USA: Antique Wireless Association - Carolinas Chapter, annual conference & Flea Market
http://cc_awa.homestead.com/index.html

March 20th, 2008
London, UK: Computer Conservation Society lecture 'The BBC Micro and its legacy'
http://www.computerconservationsociety.org/

March 29th-30th, 2008
Milwaukee, Wisconsin, USA: Midwest Gaming Classic–see and play classic arcade and video games, exhibitions and tournaments
http://www.midwestgamingclassic.com/

March 30th, 2008
Northglenn, Colorado, USA: Vintage Voltage Expo – vintage radio, audio, records, electronics, TVs, video games and more. Contests, displays, lectures, shopping, swap meet
http://danacain.com/about5.html

The best TV retro game consoles – instantly hook up to the past

There are many ways of playing those old classic games these days – from downloading emulators on your PC, to playing copies of the games on new games consoles like the Playstation or Xbox, or to buying an original games console second hand.

This month we take a look at the dedicated plug and play TV consoles playing retro games on offer and decide which are the best and whether they match up to the original games. This is one of the cheapest and easiest options available to play retro games - all of the units reviewed just plug straight into your TV and don't require any special software or hardware.

Jakks Pacific: Namco Classics TV Plug-And-Play

Games included: Pac-Man, Dig Dug, Galaxian, Rally-X, and Bosconian
Pros: The Dig-Dug game is very true to the original.
Cons: The reset button on the joystick is in an awkward place and it is easy to press it accidentally. The joystick is also not very durable and is not very accurate. Pac-Man is not very true to the original, and the sounds overall are not copied well.
Overall: 8/10

Jakks Pacific: Atari 10-in-1 TV Games System

Games included: Gravitar, Asteroids, Real Sports Volleyball, Centipede, Adventure, Pong, Missile Command, Breakout, Yars' Revenge and Circus Atari
Pros: The joystick looks very like an Atari 2600 joystick
Cons: The Adventure game is very different from the original. The paddle games are difficult to play with the joystick and the joystick is difficult to manoeuvre.
Overall: 9/10

Radica TAITO Space Invaders

Games included: Space Invaders, Phoenix, Lunar Rescue, Colony Seven, Qix
Pros: the sounds are fairly true to the original. The joystick is well made and responds well and an adapter can be used instead of batteries. Qix is very true to the original.
Cons: Some of the graphics are different to the original, including the font for the words on the screen and the bunkers in Space Invaders. There is no two-player mode. The games are stretched to fit the horizontal aspect of modern TVs. When a game is over it reverts back to the main 5 games menu instead of staying in the current game and playing the demo game on a loop like the original. Game play in Phoenix slightly different
Overall: 8/10

Atari Flashback Game System

Games include: 20 games including Centipede, Adventure and Breakout
Pros: 2-player option
Cons: Terrible joysticks and disappointing game play and graphics.
Overall: 3/10

Atari Flashback 2 Game System

Games include: 30 games including Asteroids, Breakout, Centipede, Missile Command
Pros: The joysticks are easy to use and there are 2 of them for multiplayer games.
Cons: Some of the games seem very different to the originals.
Overall: 9/10

Jakks Pacific: Activision 10-in-1 TV Games

Games include: Pitfall!, Atlantis, River Raid, Spider Fighter, Crackpots, Freeway, Tennis, Boxing, Ice Hockey, and Grand Prix
Pros: Easy to use, comfortable joystick
Cons: The outer casing is not very durable and not all games allow for 2 players.
Overall: 9/10

Jakks Pacific: Ms Pac-Man

Games include: Ms. Pac-Man, Galaga, Mappy, Pole-Position and Xevious
Pros: Galaga is fairly true to the original
Cons: The joystick is not easy to use and the timing of the game play is different to the originals – mainly too fast.
Overall: 7/10

Konami: Frogger TV Arcade

Games included: Frogger
Pros: Game play is quite good
Cons: Expensive for just one game and it is not that faithful to the original.
Overall: 5/10

Mammoth Toys: Commodore 30 Games in 1 Joystick

Games include: 30 games including Bull riding, Championship Wrestling, Cyberdyne Warrior, Cybernoid, Cybernoid II, Eliminator, Excelon, Firelord, Flying Disk, Gateway to Apshai, Impossible Mission.
Pros: Some of the games are similar to the originals
Cons: The joystick is difficult to use
Overall: 7/10

Jakks Pacific: Atari 2-Player Paddle Controller with 13 Games

Games included: 13 games including Breakout, Canyon Bomber, Casino, Circus Atari, Demons to Diamonds, Night Driver, Steeplechase, Street Racer
Pros: The games are generally good copies.
Cons: the sounds are slightly different to the originals and the paddles need greater sensitivity.
Overall: 8/10

Techno Source: Intellivision 25 Video Game System

Games included: 25 games including Night Stalker and Skiing
Pros: There is a good variety of games.
Cons: Terrible controller with a very poor response. Poor gameplay and unfaithful sounds.
Overall: 2/10

The overwhelming similarities between all these game units are that the controllers are usually less than perfect. Retro gamers have a very good memory about how the originals played, sounded and looked like and furthermore it seems inexcusable in this day of advanced technology to omit any detail from these old games.

A lot of fans disagree on which

were the best games to include on these units and a lot is down to personal likes/dislikes as opposed to whether one game was technically better or more successful than another.

Everyone applauds the idea of these consoles however, and it seems that there is certainly room for improvement in any future development. There are many more popular games to replicate yet on our modern TVs. If any budding retro TV game manufacturer is reading this – how about a BBC or ZX Spectrum computer game stick? ■

Doom and the birth of LAN games

Network games had been around since the 1970s but didn't really take off on a mass scale until the mid 1990s with the launch of Doom and 'Doom clones'.

One of the most popular genres of game for large-scale network multiplayer gaming is the first person shooter (FPS). It is very easy to start playing an FPS because it mainly involves just choosing a weapon and shooting others.
The first FPS is believed to be the Midi Maze game for the Atari ST in 1987, which allowed for up to sixteen machines to be linked together. There was even a 'deathmatch' mode in the game. There was also a 3D FPS game called A-Maze-ing for the Macintosh in 1989.

In 1992 id Software created Wolfenstein 3D which was the first FPS for PC computers. This was popular but nowhere near as popular as the game id Software created next, namely, Doom.
Doom was the pioneering force behind that brought the FPS gaming culture to the masses and defined the FPS as a genre in its own right. It also coincided with advanced hardware developments for the PC (Intel Pentium processor and mulimedia graphics cards).
For those who haven't played Doom before, the player takes the role of a space marine who has been deported to Mars for assaulting a senior officer when ordered to kill unarmed civilians. He is forced to work for the Union Aerospace Corporation (UAC), a military-industrial conglomerate that is performing secret experiments with teleportation between the moons of Mars, Phobos and Deimos. Suddenly, something goes wrong and creatures from Hell come out of the teleportation gates, or "Gateways". A defensive response from base security fails to halt the invasion, and the bases quickly get overrun by demons; all personnel are killed or turned into zombies. At the same time, Deimos vanishes entirely. A UAC team from Mars is sent to Phobos to investigate the incident, but soon radio contact ceases and only one human is left alive — the player. The objective of each level is simply to locate the exit room that leads to the next area while surviving all hazards on the way. Among the obstacles are monsters, pits of radioactive slime, ceilings that come down and crush the player, and locked doors for which a keycard, Skeleton key, or remote switch need to be located. The levels feature plenty of hidden secret areas that hold power-ups as a reward for players who explore.

Doom kick started the online gaming as we know it today through the introduction of the following:

- the ability to socialise/communicate with fellow players online
- the ease of hooking up to a game without needing any special software
- the ease with which a newcomer can instantly start playing a game

The online games which followed Doom, used the following features inspired by Doom:

- the player starts off with no weapon or very little weapons, such a pistol, and then has to find the larger more powerful weapons such as rifles or rocket launchers
- the player can find first aid kits or other 'health' kits to boost their survival chances
- there are other pieces of equipment to be found which enhances the player's ability such as backpacks, torches or jetpacks.
- There are secret areas in the game which reward the finder with extra weapons or health.
- Cooperative play mode where team players join forces to fight against computer driven enemies
- Deathmatch mode where players fight against each other

With the introduction of more sophisticated PC hardware, gameplay was enhanced with more realistic graphics. Shadows and varying light levels were used along with full texture mapping. Stereo sound was also used and enemies can hear sounds made by the player.
Another important feature of Doom was to allow users to create their own game content to be used in the game.

Distributed as shareware, *Doom* was downloaded by an estimated 10 million people within two years. LAN parties – gatherings of computer players - sprang up to play online multiplayer games and this increased as the decade went on. Company policies had to be re-written to stop employees at

work misusing their time and the network for playing network games

In 1994 Doom was awarded Game of the Year by both *PC Gamer* and *Computer Gaming World*. It also received the Award for Technical Excellence from *PC Magazine*, and the Best Action Adventure Game award by the Academy of Interactive Arts & Sciences.

Soon after Doom, 3D Realms released Duke Nukem 3D which was immensely popular and this was followed by id Software's Quake in 1996.
Quake and Duke Nukem were the first true 3D games and the first games that could be played over the internet in real time. The biggest boost to their take-up was from the launch of Windows 95 which made it very easy for users to hook up to a network or the internet, plus install and configure these games.
The average PC user had now heard of Quake and Doom and would have found it relatively easy to network with other players – either in the home or over the internet.
Online service providers started to introduce flat rate connection packages as opposed to hourly rates, which would make online gaming cheaper.

Following this, Epic Games produced Unreal, in 1998 and Valve, released the game Half-Life. Both were very popular and successful FPS games which again used elements from Doom.

The late 1990's and early 2000's saw some great FPS advances and they had an increasing player base. Other multiplayer genres came into the fore such as real time strategy games. With greater access to broadband/high speed connections and with more equipment being capable of network gaming (phones, PDAs, consoles etc), the seed sown by Doom and its contemporaries has well and truly flourished. ■

Magnavox Odyssey – the first home video game system

It had no CPU, score, sound or colour but over 100,000 were sold in the first year.

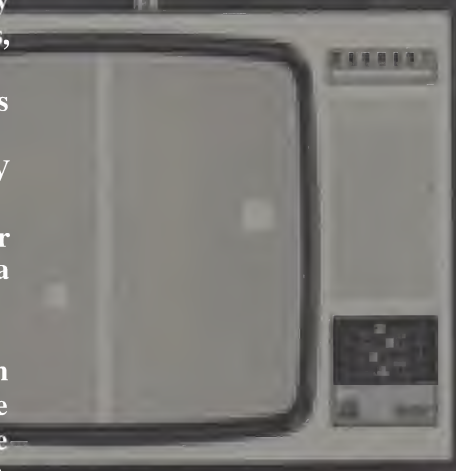
In 1966, Ralph Baer, who was working at Sanders Associates, started designing a TV game system. He created the 'Brown Box' in 1968, which could play multiple games such as tennis, shooting, volley ball and football, using simple switches on the front panel and using transparent overlays on the TV screen. Unlike the later Odyssey, which omitted this for cost reasons, it could generate a colour background. In 1969 Baer added a light gun and joystick interface to the Brown Box, actually making this the first programmable video game (albeit non commercial) system.

In 1970 Baer demonstrated the Brown Box to Magnavox TV-Set and Magnavox was then licensed to make and distribute the 'Odyssey Home Entertainment System' in 1972.

Initial sales were hurt because customers thought that the console only worked on Magnavox TV sets. The packaging later added that the Odyssey worked on any TV set.

The other hiccup for Magnavox was the new Atari Pong system created by Nolan Bushnell in 1972. Magnavox sued for copyright infringement and won a $700,000 settlement.

The Odyssey, however basic by today's standards, was still a popular product and marked a crucial change in the way people used their TVs.
The marketing stated that the user could now actually `participate' in television and not just be a spectator, with the system manual describing it as:



`The exciting casino action of Monte Carlo, the thrills of Wimbledon, the challenge of ski trails – can be duplicated right in your own living room.'

It had no CPU, no score mechanism and no colour or sound. In fact there were only 40 diodes and 40 transistors inside powered by 6 x C batteries or an external adapter. Six cartridges could be used to play up to 12 games - sometimes the same cartridges being used more than once to play different games. The large number of game accessories that came with it (paper money, game chips and cards) allowed for different games to be played, with some games using the accessories as a main focus for the game instead of the console.

Each game used a plastic transparent colour overlay that was to stuck to the TV set. The overlays compensated for the fact that the Odyssey could only produce a vertical line, a dot for the ball and 2 shorter lines (representing each player controller) on the screen. The overlays were meant to attach to the TV by use of static electricity and smoothed over by hand or a soft cloth, but the instruction manual said if this didn't work one should use tape instead. It even suggested that you could trim them down to fit your TV set!

The controllers are in fact two largish block sized controllers with a round dial on either side. Twisting the dial on the left for horizontal movement, and the right for vertical movement. An `English' dial on the left of each one controlled the `deflection' of the ball. Ball speed could also be controlled.

The games included tennis, ski, hockey, table tennis, simon says, analogic, states, cat and mouse, submarine, football, haunted house, roulette, invasion and shooting games (with the optional rifle that could be purchased separately for $100). Add-on games were sold individually at the price of $5.49, or by packs of 6 at the price of $24.99.

The machine was discontinued in late 1974 or early 1975. An improved version using integrated circuits, the Odyssey 100, was then released. ■

Commodore calculators

Following a visit to Japan in the late 1960's, Commodore's founder, Jack Tramiel decided to introduce electronic calculators to the North American market, convinced that there would be a lucrative market for them.

Casio made the earliest of these calculators, specifically the Commodore 1121 and the 1161, which were 12 digit, 4 function calculators. Between 1968 and 1970 sales rose from $4.1 million to $9.4 million.

In 1969 Commodore made calculators using semiconductor chips made by Texas Instruments then in 1971 they introduced the C106, the first mass-market compact electronic calculator for consumers.

Their first pocket calculator was the C110 which weighed 320g, had 8 digit LED display, four functions with low battery indicator, Reverse Polish Notation logic and rechargeable batteries.

Very soon after the C110 launch came the first of the Minuteman line of calculators in early 1972. The name 'Minuteman' came from the elite US military unit in the 17th Century who were required to be highly mobile and arrive quickly to the scene of battle. The Minuteman 3 series, produced from 1973, were very popular. Most weighed around 160g and had a smooth white plastic case with raised keys coloured white, red and blue. Functions included percentages, preset decimals and a two-function memory and they contained chips made by MOS, which Commodore was later to buy.
The Minuteman 6 series came next and these were smaller calculators housed in grey cases. Some in this series had rectangular or oval shaped keys.

By now prices for calculators had dropped from $400 to between $50-$100 and there was greater competition from Texas Instruments who in 1975 launched their own calculators which cost less than the Commodore calculators.

In 1976/77 Commodore produced calculators with ever more functions e.g. square root, reciprocal, pi, squares, factorial, sign change, register exchange, integer, five function memory, trig and transcendental functions. Some displays were green vacuum fluorescent displays.

In 1977, Commodore came out with their ultimate specialized calculators: M55, N60 and S61 (known as the "Series 60" line). The M55 was designed for mathematicians, and contained operations such as Bessel functions and Legendre polynomials; the S61 was capable of computing values for nine different statistical distributions; and the N60 had flight navigation functions. 1978 saw lighter, smaller calculators with amber LCD displays.

Commodore had a strong European division which marketed models that were not sold in the U.S. Many of these are recognizable by the use of the CBM name and logo. ■

The first personal cassette players or 'walkmans'

The personal stereo, or `walkman' was one of the main symbols of the gadget-mad 1980's.

The original idea for a personal stereo cassette player came from the inventor Andreas Pavel in 1972. He patented the Stereobelt which was the first wearable electronic entertainment device, namely a personal cassette player connected to headphones.

The idea was then taken from Sony who had previously produced their Pressman – a portable cassette recorder-and a pair of headphones. Sony chairman and founder Akio Morita heard of the invention and was eager to market it, but the rest of the management team fought the concept. This inexpensive device couldn't record, and it didn't even have a loudspeaker.

In the end, in 1979, Walkmans were being manufactured, but under the previous names of the Sound-About in the USA and the Stowaway in the UK. The name *Stereo Walky* was proposed as this conveyed portability with 'wearability' but Toshiba was already using the "Walky" name for their portable radio line. The name *Walkman* was taken from the earlier Pressman name.

Sony sent Walkmans to Japanese recording artists, TV and movie stars free of charge. They also began an innovative marketing campaign, targeting younger people and active people. The imagery Sony successfully used around their Walkman gave the feelings of fun, youth and freedom. A Walkman was also a convenient-to-wear fashion accessory.

They decided to hold the launch event outside and included demonstrations of people listening to the Walkman while roller skating or cycling. After the launch, staff of the publicity and domestic marketing divisions took a Walkman and spent a day riding busy trains around the centre of Tokyo in an attempt to advertise the product.

The first Sony Walkman was the blue and silver model TPS-L2 which cost $200. It featured stereo playback and two mini headphone jacks, permitting two people to listen at the same time. It had a "hotline" button which activated a small built-in microphone which partially overrode the sound from the cassette, and allowed one the user to hear outside noise instead of the music user to talk to the other over the music. There was also separate left and right channel volume controls.

The initial batch of 30,000 units sold out by the end of August, and thereafter production levels had to be constantly raised to meet consumer demand.

Other audio companies started selling similar devices. Toshiba had their *Stereo Walky*, Infinity had their *Intimate*, Panasonic sold their *Stereo-To-Go*, GE marketed their *Escape*, and even discount audio producer Craig followed suit with the *Soundalong*. JC Penney, Radio Shack and Sears also produced their own players.

Notable models included the Aiwa TP-S30 which offered recording and playback, the GE models which offered a mute switch and high and low tone controls, the Sanyo M5550 which had a variable speed dial, the Infinity Intimate offered Dolby noise reduction and some other Aiwa units offered wireless headphones. In 1982 JVC offered the CQ-F22K which had an auto-reverse feature.

In 1983 prices had come down to the $50-$100 mark and saw the introduction of sound and battery level LED indicators, and water resistant (splash proof) cases. Most cassette players only needed two AA batteries as opposed to four.

Sony offered their Walkman II, or WM-2 in a small, shapely all-metal chassis. This was the most successful model of all time, having sold 2 .5 million units.

At this time many groups raised concerns with the danger of using personal cassette players whilst walking or driving, and possible damage to hearing from the loud volume through the headphones. This is paralleled with today's concerns over the potential health hazards of mobile phones – these are valid

By 1985 many models featured graphic equalizers, anti-rolling, tape direction change and auto-reverse features for ease of use. Sony announced a belt-free "direct drive" mechanism for remarkably low wow and flutter.

In 1986 Sony announced the D-50 Discman, a portable audio device that played a new digital medium called the compact disc, but this didn't seriously hurt cassette player sales. CD players were much more expensive, their batteries did

not last long and they weren't very shock resistant.

In the late 80's, prices lowered to the $20 (although there were still professional high end expensive models). There were now solar powered cassettes available, like Sony's WM-F107, models that contained two cassette drives, digital tuning, rechargeable batteries and logic controls.

Sony launched the playback-only WM-DD9 in 1989 during the 10th anniversary of the Walkman . Power consumption was improved by requiring only either one AA battery or one gumstick-type rechargeable, with optional AC adaptor input. Sony made this model with only sound quality in mind and contained no gimmick features such as in-line remote control, music search, or LCD readout.

In 10 years after its introduction, Sony alone sold 50 million units, including 25 million in the USA.

Every five years since 1979, Sony would celebrate by coming out with an anniversary cassette model on July 1st with unprecedented breakthroughs in technology and features. Each anniversary model carried a different theme while retaining some characteristics of previous anniversary models.

After 2000 the cassette format was gradually phased out. The last play-only cassette Walkman to be introduced (in North America, at least) was the WM-FX290, first sold in 2002. ■

Early pocket televisions

An interesting branch of vintage technology is the development of pocket televisions.

The term 'pocket' refers to televisions that were intended to be carried in the pocket or small bag, as opposed to 'wearable' TVs e.g. worn on the wrist or waist or 'portable' or 'luggable' TVs. The following also only concerns TV receivers as opposed to video/DVD players.

The first attempt to make a miniature TV was in 1966 when the Microvision was created by Sinclair Radionics in the UK. This was a very challenging exercise as LCD displays had not yet been invented and so miniature cathode ray tube screens (CRT) had to be made. Additionally, CRT screens used a lot more power than LCDs. The Microvision had a 2" 405-line receiver which could pick up 13 channels. The speaker was a 2" piezoelectric transducer and the whole set weighed 10.5 oz. Advertised at a cost of 49 guineas (£50), it never went into production as it was too impractical to make and service.

Motorola researched the idea of producing a 1.8" screen mini TV set at this time, but this never came to fruition.

In 1971 National Panasonic came out with their Travelvision a mini TV with a 1.5 inch screen and weighing only 890 grams. There were brightness, contrast, volume and channel selector controls, plus sockets for an earphone, ac adapter and external antenna.

It was a good ten years since their first foray into TV set production before Sinclair produced another mini TV and this came in the form of the MTV1, which had a mini CRT screen and sold for $400.

The Sony Watchman FD210, introduced in 1982, was the first mass-produced pocket television. Although the screen was a small 5cm across and the unit weighed 650 grams, it was still fairly large to actually put in a pocket at almost 20 cm high and 9 cm wide. It could produce a watchable picture even in poor reception areas. Power came from four AA sized cells, which lasted for a reasonable time, certainly long enough for an evening's viewing. To save power, the set could be switched to 'sound only' mode.

Soon after this time Sinclair brought out the FTV1 (or TV-80), but this didn't sell well in principal owing to the high price of the batteries (£10 for three batteries which were not rechargeable).

1983 saw the first LCD screen pocket TVs with the CASIO TV-10 and then in 1984 with the first colour LCD screen TV in the form of the Epson ET-10 (or 'Elf''). LCD TVs were lighter and smaller but the picture quality was not as good

as the CRT TVs and it was only practical for one person at a time to view the screen. The ET-10 came with a screen-magnifying lens to improve viewing. The ET-10 could be connected to a VCR however and was usable

in bright sunshine as well as dim room lighting.

Throughout the 1980s Sony continued to stick with CRT displays as the picture quality was better, but then from 1990 produced LCD models to keep up with the competition who were moving to colour screens. ■

Interview with Tilly Blythe – curator of Computing at the Science Museum, London

By Abi Waddell

How long have you been curator at the Science Museum for?

I became the Curator of Computing and Information at the Science Museum in April 2004, so just over 3 years

How did you get the job of curator of the computing collection at the science museum?

I saw it advertised, applied for it and got it!

Do you collect any digital history artefacts as a hobby?

I have a few bits and pieces, but it's not a coherent collection. My favourite things include a first edition of Ted Nelson's 1974 classic 'Computer Lib/Dream Machines'. It's an astonishingly prescient book where Nelson uses cartoons and links between pages of the book to develop the idea of cyber culture and hypertext. The book was originally brought directly from the Whole Earth Catalogue. Looking through it today you can see that Nelson was a real trailblazer in relation to the culture and networking of computers.

What interests you the most about your job?

I'm in the enviable position of being able to identify and acquire significant computing items for the National Collection, but that also means you have to develop a strong sense of items that are culturally and socially important, not just technological firsts or breakthroughs. It fascinating to try and identify contemporary items - be those computers, portable devices or software - that will engage our audiences and evoke meaning and stories from them in the future.

What in the collection is your favourite exhibit?

I love our clone of a Sinclair Spectrum created in Siberia and acquired by the museum in 1985. It's a wonderful example of the global computer industry and the development of Eastern block clone machines during the micro computer 'revolution'. It's also a beautiful piece of industrial design; made out of white plastic its more reminiscent of today's Apple machines than the original Spectrum machine.

What do visitors like to see the most?

Many of our visitors come to see Charles Babbage's Difference Engine No. 2. This was the machine that Babbage designed between 1847 and 1849 to automatically calculate mathematical tables. He wanted to create mathematical tables that were much more accurate than the hand-produced versions available to Victorian engineers, scientists and navigators. The machine was never completed by Babbage himself, but in 1985 the Science Museum decided to build the machine using Babbage's original designs and materials and techniques that would have been available in Babbage's time. The great number cruncher was brought to life in 1991 when it completed its first error free calculation. Today, the noise of the engine as the handle is turned is

one of the most emotive sounds in the museum.

Which exhibit do you think is the most important?

Our collections are one of the most important computing collections in the world. They represent the very earliest pre-history of computers, business machines, valve machines and early personal computers such as the Altair 8800 and the Apple 1. Their importance is as a coherent collection and I simply couldn't choose just one machine. That said, one of the most loved exhibits is the Pilot ACE computer that was designed and built by the National Physical Laboratory in Teddington in 1950. The design for ACE embodied the original ideas of the mathematician Alan Turing. It reflects his pre-war theoretical work on computation and his conceptual discovery of the Universal Turing Machine - a computer that is not structured to carry out particular tasks, but can perform any task specified by programming instructions. The machine is on display in our *Making the Modern World* gallery and had over 800 valves and two mercury delay lines for storing information.

What sort of visitors do you get to the collection? Are there many computer history students about?

Our galleries at the museum attract around 2 million visitors a year. This includes families and children, adults enthusiasts, school parties and young adults. Our tours of the computing collection in the stores attract a number of more specialist enthusiasts. Some are people who have worked in the computing industry for a long time, some have started their own collection of items and a few are studying computer science and want some historical perspective. We've even had a number of artists who are fascinated in Britain's digital heritage. Computer history students tend to come from Manchester University, but anyone with an interest in maths and programming can, and does, find themselves drawn in!

Do you think that the history of computing reflects what might happen in the future - for instance rate of progress?

I think we need to be wary of believing the rate of change, and indeed technological progress, has significantly increased since the advent of the computer. There is one thing that occurs to me when I'm in our *Making the Modern World* gallery and am faced with 250 years of technological change. And that is that many of our *claims* for technological innovation haven't changed during that period, at all. From 1750 to the current day, humans have depended on the same arguments for understanding and contextual sing the change around us. We have *repeatedly* claimed that technology is revolutionising our everyday lives and that we are subjected to a rate of change never previously experienced. The Victorians had an insatiable belief in steam, and they visibly transformed landscapes by building canals, railways, bridges and water schemes, leading to a transformation across the globe. Our era is defined by computers - but lets not believe that we are unique in rapidly transforming the world around us.

Do you try and restore broken machines? If so, how do you find people with the necessary skills/knowledge?

We are lucky enough to have a strong group of volunteers from the Computer Conservation Society. Their help is invaluable to us as many of them have the skills, knowledge and enthusiasm to maintain our early machines. We currently display one of the oldest working computers, the Ferranti Pegasus machine from 1956, and have this running on gallery every other week on a Thursday. We are also working with the Elliot 401 working party who are trying to restore the 1953 machine that was used at the Roth Amsted Experimental Station.

Is there any machine/artefact that you don't have but which you would like to acquire for the collection?

We would love to acquire a Alto machine developed at Xerox PARC in the 1970s, as it was the first to develop a WIMP (Windows, Icon, Menu, Pointer) interface and set the standard for the type of Graphical User Interface we expect today. Unfortunately they are very rare, but we keep hoping for a kind donor! ■

What type of collector are you?

Most of us probably fall into more than one category but here is a list of collector types:

Investor - 'Mint condition'

This person's collection will hopefully be worth something in future and the collection is made and cared for with a view to selling on at a later date. The items in the collection come in all their original packaging and boxes and many things won't even be opened – thus increasing their market value. Even the boxes and instruction manuals are unbent and unscratched.

Finisher – 'Complete collection'

This collector almost collects for the simple sake of collecting – a pastime which they love and which is almost more important than the objects in the collection. They seek out every series of item made by a particular company or everything to do with a specific machine or everything under a specific genre. They are true collectors and will not relinquish items in the collection lightly. Some of these go on to become Investor collectors by swapping some of their shoddier/broken items with the mint condition equivalents. Finishers are frequently the only source of information about every single kind of peripheral or accessory on a specific item. But this information is usually only useful to other Finishers who want to complete their collection!

Speculator – 'Might be worth something…'

This collector is mostly motivated by quick cash. These are the first to buy up items of a particular brand or type, or buy limited editions of

something which is still relatively new. They usually sell their items at the earliest opportunity before buying up the latest gadget. Sometimes these people are responsible for creating a demand for popular or rare items in the first place – if they say it's a collectible and is hard to find – we tend to believe them and this elevates the item to heights of rarity and desirability. Their main downfall however is not waiting long enough before selling their collection – or perhaps waiting too long.

Caretaker – 'just ended up with it'

This person acquired their collection from someone else. They have no real interest in the collection but feel duty bound to keep a hold of it. Many such collections are donated to museums or other collectors or are sold as soon as possible. Some of these people may even turn into Part Time collectors if they develop an interest in the subject.

Historian – 'future generations need to know'

The Historian collector is motivated by the collection's historical significance. It doesn't so much matter that the objects are broken or incomplete – it is the fact that the object is the first one of it's kind or that it was actually used by (insert famous person's name) to do a memorable thing. The collection might not be full of popular and well-known items but it will have the most informational value. They will

collect the documentation associated with a specificitem (news cuttings, books, manuals, adverts etc) and they will also catalogue their collection. They will also create documentation around the collection - e.g. labels, spreadsheets, lists, serial numbers, photographs etc. They often take good care of their collection and may even start their own museums or hold public or private exhibitions. Like the Speculator, they tell the rest of us what is interesting or rare, however they wont be so quick to cash in on their collection.

The part time collector – 'looked what I picked up the other day'

Many people fall into this category – it's fun to pick up a few interesting or nice things along the way and the items usually have a use other than just gathering dust in the loft. The Roberts radio will still be used, the Centipede arcade game will be played with and the 1970s led watch will be worn. Many of these items do end up gathering dust in the loft though when the Part Time collector takes a fancy to something else. They will probably end up hanging on to items and eventually selling them for a profit at a later date but they will not really understand the true value of it. Investors love Part Timers because they can buy things at a lower value. Some Part Timers have dreams of owning a highly prized and sought after collection but they don't have the time or money to properly acquire such a collection.

Repairer – 'it lives again'

One of the rarest types of collectors is the Repairer who basically tinkers and fixes those machines we broke earlier or basically dare not touch. These people used to work as electricians or engineers in the past and have a lot of knowledge about how machines were made. They collect broken machines to use the insides or outsides for spares, so they can get working machines again. They live for the thrill of restoring a dead machine to its former glory and in this respect they would make great Investors. Some collectors are blessed with having Repairer knowledge and know-how even if they are a different type of collector. The Repairers don't spend much time teaching the rest of us how to fix up broken objects though, and the other collector-types need to pick the Repairer's brains as much as possible before they die out.

Personal use - 'they don't make 'em like they used to'

Unusual and not technically a collector, but an interesting person nonetheless. This collector has things from the past because the items are more useful or perform a function not found in modern items. They believe that their 1970s record decks have a better sound quality than modern turntables, or that their vintage Hewlett Packard calculator does the job just fine thank you. If they have been using

something for 20 years and it hasn't broken – why trade it in for a modern version?

Hoarders – 'just can't throw it away'

They collect everything and anything and have a problem with throwing things out. Items will be a mixture or all sorts and will be kept for no other reason than it can't be thrown out. Many of these people are driven by fear of losing their past, which has been brought on by a yearning to live in the past. They will have many duplicates in their collection and many broken items. They are useful to Historians because they have items no one else has bothered to keep (newspapers, magazines, manuals etc). ■

Personal robots of the 1980s

Robots effectively put a face to the concept of having technological 'brain-in-a-box' in the form of a microcomputer.

Personal computers were one of the things in the 1980s that reflected the general theme of the `future'. The idea that home computers could intelligently perform practical labour saving functions naturally led to the creation of personal robots.

Much like home computers, personal robots were created with the intention of performing serious functions. This is also a reflection of an era where the future was synonymous with using technology to do the boring and laborious tasks people didn't want to do. The reality was however, that home computers were generally used for playing games as opposed to controlling the central heating in the home, and likewise, robots were better used as toys than as something to do the vacuuming.

Robots had always been around as toys before the 1980s of course, but they had not really been programmable. In the early 80's, robots were now capable of moving round corners, picking up objects and being controlled by voice commands.

Toy or personal robots of this time had some of the following common technical features:

- Ability to move forwards, backwards, left and right
- A controllable `arm' or hand.
- Could be given simple movement commands
- Possessed other technical functions such as an alarm or clock.
- Used the BASIC or LOGO languages
- Could either be controlled by a separate microcomputer
- Possessed an expansion or user ports to add other devices.
- Had plug in cartridges with extra software.

Tomy was the leading robot toy manufacturer, producing the famous Omnibot robots, plus the smaller robots which performed only one or two functions, such as Verbot, Dustbot, Dingbot, Flipbot and Spotbot.
Omnibot could be controlled via an RF remote controller and with the use of voice commands which had been pre-programmed into the main unit. The Omnibot 2000 could pour drinks on a special serving tray!

Another toy robot was MB Bigtrak, which was one of the most desired toys of the early 80's. It could move around in all directions and could move and drop off objects in a trailer attachment.

For those who wanted to construct their own robot which would be controlled by their home computer, there was no shortage of manuals and programs on how to do this. The common user or input/output port on many micros enabled a BASIC program to control a motor built into a constructed robot via a cable. Such robots could be built from scratch or ordered in kit form to be built at home. Typical functions of these robots included following a set route, drawing lines to make pictures, following a light source, picking up and dropping objects.
Most of these robots were driven by low voltage electric motors, so a transformer or batteries were used to power them.

The BBC Buggy was such a kit robot, being made from Fischertechnic construction kit

parts. The Buggy transmitted invisible infrared light down to

the ground, and then received it back when it was reflected by the surface the robot travelled over.

The Turtle is another example of such micro robots. It was a mobile robot which could be programmed to draw with a pen as it moved around. The language LOGO made the robot move in units of about 1.5mm at a time. Each unit that the Turtle moved, was measured by a sensor mounted over a cog on each wheel. A tiny lamp on one side shined a beam of light between the teeth of the cog into a photoelectric cell on the other side. The teeth broke the beam of light as the wheel rotated. Each break in the light path was detected by the photoelectric cell, which sent a message to the computer to count one unit.

Lesser-known but equally important personal robots of this era included Androman, which was used with the Atari 2600. This 12-inch robot was controlled by a joystick via an infrared signal and moved about a three dimensional playing surface while the game action occurred on a video screen.

The TOPO robots used a one-way RF remote control from an Apple II+ computer. It could be driven around with a joystick or have the movements pre-programmed. To program the movements you would either use Apple BASIC and call the driver to make the TOPO move, or use LOGO and the TOPO Logo extensions.

The GEMINI robot was an ambitious attempt to have an all singing all dancing robot both for work/business and the home. The manufacturer claimed that it could teach your kids history, music and maths, it could recite stories and poetry, it could sing songs and allow you to write music, it could remind you of birthdays, wake you up in the morning and control the temperature of your home. It could also be used as a security guard for your home

"*When the robot can call upon the optional remote computer, GEMINI becomes a particularly effective security guard. It is well known that only the most hardened criminals will enter a house that is occupied. Just schedule GEMINI to make the house look occupied. Let the robot move around turning on/off the TV, radio and lights. Let it talk in several different voices to make it appear that several people are in the house. Let the robot use its sophisticated array of motion and infrared sensors to spot an intruder, and then schedule GEMINI to phone you if something is detected. If you are worried while you are away, you can even phone the robot for a status report. And GEMINI can use its onboard smoke detector to watch out for fires.*"

The marketing even suggested that the user could write an EXPERT system to predict the weather using GEMINI's built-in barometer!

Heathkit HERO robots were also very successful, claiming to have the same abilities as the GEMINI, i.e. sing songs, play games, tell nursery rhymes, recites poems, guard your home and wake you in the morning. Like other high-end robots, many could carry a tray to bring their owner a drink! They also had speech synthesizers, motion and range detectors, real time clocks and light and sound sensors. Most had an RS-232 port to connect to a home computer. Programming the robot could be done by recording the movement commands to a regular cassette tape which can be played back at certain times by using the built-in clock.

Even if these robots weren't used for serious purposes, they would have been a lot of fun and a great learning toy for both the big and little kids. ■

The first LCD watches and their evolution

What do you get if you add portability, a reasonable price and the latest electronic gadget? The latest collectors' item.

Currently the 1970s and 1980s digital watches that attract the most attention from collectors are the LED watches. Less sought after, but no less interesting, are the LCD digital watches of the same time. LCD watches were mostly developed after the introduction of LED watches, from the end of the 1970s but there was some overlap.

Liquid Crystal Display first became possible in 1972 with the invention of the Twisted Nematic Liquid Crystal Display (TNLCD), following decades of research into liquid crystals at Hull University. It allowed a lower power level to reflect light onto a passive screen. However, this first breakthrough proved impractical due to the lack of photo chemically and chemically stable nematic materials in existence in liquid-crystal form at room temperature. A year later this problem was overcome when scientists discovered that a crystal known as cyano-biphenyl, could be made to change from one form to another near room temperature; these then were used in LCDs. They were first used in calculators in 1972 but the displays were still too big for watches.

Seiko was a leading company in the watches industry. They created the first wristwatch made in Japan (1913). In 1955 produced the first self-winding wristwatch and in 1969 introduced the revolutionary quartz watch Astron (35SQ) which was the first in the world to use this technology. In 1973 they introduced the first LCD quartz watch with 6 digits display. Two years latter introduced the world's first multi-function digital watch.

By late 1973, Sharp was marketing calculators with their variation of LCD technology called "Crystal on Substrate" or "Calculate on Substrate" (depending on which Sharp advertisement you read) or COS for short. Yet it too did not catch on, probably for a combination of economic and engineering reasons.

Subsequently, by 1976-77, what can be termed "nearly-modern" LCD technology was refined enough for use on calculators. Its appearance still differed from today's versions by needing a yellow "screen" or filter to protect the ultraviolet (UV) light sensitive display surface.
By 1978-79, the UV problem was overcome and "fully-modern" LCD calculators, with today's familiar grey-coloured display surfaces, became available.

In the late 1970s LED watches commanded higher retail prices but were fairly limited in functionality. The LCD watch had not only a longer battery life, but offered more functions, such as calendar, alarm, timer, and calculator. With LCD technology behind it, the digital watch captured more than half of all watch market share. Prices plummeted as the result of an infusion of products from

existing electronics suppliers and watch manufacturers as well as players in China and Southeast Asia. It was almost a game to see what electronic device could be miniaturised enough to put in a watch.

LCD watches of the era had one or some of the following features:

Alarm
Calculator
Stopwatch
Melodies
Games
Calendar
Metric converter
Light
Water resistance
Data bank
Clock face display
Radio tuner
Thermometer
Translator
TV

Some of the early calculator LCD watches were operated by use of a small stylus. Alarms were high-pitched beeps, but eventually allowed melodies to be played. Some models incorporated several different melodies for different alarm times. The development of the mobile phone today has followed a similar pattern – namely, the first models just allowed calls to be made/received and then ring tones went from basic noises to complex music.

Most LCD watches in the 1980s had a light that could be activated only for the time a specific button was pressed. Most watches only had the one light shining from one side, which sometimes made it difficult to see all the digits on the watch face.
Games on watches were very basic – following the usual invaders or card game concepts using a series of dots and dashes for the images. The Nelsonic Pacman watch even had a mini joystick on the front. From about 1982, a watch was something other than a timepiece first and foremost – telling the time was secondary.

Databanks were a popular concept then and some watches emulated the batch of dedicated calculator-style databanks that went on the market. Most of these databanks (either dedicated or on watches) were used to store names and phone numbers.

One of the most unusual watches of this period and one that is now very rare, was the Seiko TV watch, which was produced in 1982. Containing a miniature LCD television, it still remains the world's only television watch. It was the size of a large digital watch with a digital display at the top for the time and a 1.1-inch liquid video display at the bottom for television. It had an integral TV screen and a Walkman-size unit that was a TV/FM stereo receiver, and also a pair of headphones and the headphone cord which contained the antenna. The owner could keep the receiver inside their jacket pocket and run the cord to the watch down the inside of the sleeve. The display wasn't in colour and nor was it black and white, being shades of blue and quite pleasing to look at. Watching this screen however is definitely a novel experience but there is only so much you can discern on such a small screen. At the high price of $500, not many of these were bought at the time.

Less rare and cheaper at £99 was the Seiko Wrist Terminal RC-1000, which provided a database interface with popular computers of the time (Apple II, Spectrum, IBM, Commodore C64 etc). Upon its release in 1984, it was advertised as a `mini-word processor' and data file manager which used Basic to upload information from the computer to the watch via a standard communications lead. The watch could also display times in different parts of the world and enable files to be printed.
Also unusual was the Casio watch that could dial your phone number, the watch Citizen produced that could react to one's voice, the Armitron watch which had a concealed membrane keyboard and the Citizen AM and FM radio watch from 1985.

Some interesting newsgroup snippets from 1984:

"I shopped around a little and wound up getting the Armitron Wrist-Comp 101 for $25 at Service Merchandise. It turns out this watch is pretty impressive for $25. It has the usual calculator (4 function, 8 places, floating decimal but no E-notation, no memory or auto-constant) plus an alarm and optional 24-hour time. It also will remember up to 42 phone numbers, keyed by alphabetic name. It's kind of a pain to store the numbers, but the interface for looking up a phone number is very easy to use. Just type the first letter (a 2 key operation on its 16 key pad) and if it doesn't put up the one you want (because it's not the first number indexed under a name beginning with that letter) hit the 2nd key repeatedly until you see the one you want. The 8 character alphanumeric display is fairly easy to read (although the eights look like zeros due to a two segment horizontal bar in the centre).
It has no stopwatch. (No big deal to me.) It also has no backlight (what? I thought all LCD watches had backlights. Not this one!) And after wearing it 23.5 hours/day for a few weeks, I discovered that the buttons in the lower right corner were getting mashed down. The =+ key in the corner has to be hit just right to register. I guess sleeping in the watch tends to mash it in ways it doesn't like. I

wonder if other calculator watches have the same problem?"

"I use an HP 41CX calculator for an alarm function. I can set an alarm for a specific time years in advance, if I want, and can have it repeat at regular intervals after that. I presently have 17 alarms set in my calculator, which I carry in my trousers pocket, some of which repeat daily, some weekly (to remind me of regular meetings, etc.) and some for a single event. Each alarm has an alphabetic message of up to 24 characters, or can run a program to do almost anything. For a single event, I usually set the alarm for 15 minutes before the time and have it repeat every 5 minutes. When it beeps I can acknowledge the alarm by pressing the ON key without removing the unit from my pocket, and when I do the thing it is reminding me of I hit 2 keys to permanently cancel the alarm. In addition to the time functions, I use the calculator for general computation, as a "talking" clock when I'm in bed (hitting the ON key causes it to beep the hour and nearest 10-minutes in two different tones so I can find out what time it is without turning on a light or even turning around; an alarm automatically runs the program which sets this up at midnight and another cancels it at 8am), and for playing games when I'm bored. The HP 75 and new HP110 Portable computers have similar, but more powerful, capabilities, but they don't fit in my pocket."

"I looked at the Seiko watch. It costs $200 here in Columbus at JC Penneys, presumably discounts are available. Basically it's a watch with a 4 line x 10-character (5x7 dot) display - huge for a watch. It has a reasonable alarm and very nice stopwatch, plus two scratch pads. You have to use the keyboard to enter things into the scratch pads, each pad holds about 1Kof text (100 lines of 10 chars each). What it could NOT do (and why I didn't buy it) was keep my calendar. It cannot, for example, remember more than one time to wake up, nor can it do anything more intelligent than beep when it does (the font has characters for phone calls, meetings, dinners, and airplanes, but they are just regular characters). Such a waste.
Also, in the store, the display was almost impossible to read. All the dots were dark, not just the ones that were "on". As a result, I had to twist it under the light until I could barely make out the display. Perhaps the battery was low, but this was a serious botch, and the clerk had no idea why."

Cleaning old electrical equipment

Cleaning old electrical equipment isn't a subject that is given much attention normally, yet it is important to know how to do this properly.

Not only does cleaning enable some previously broken equipment to work, can raise the value of an item and improve it's aesthetic appeal, but can reduce any potential health risks posed by hazardous chemicals and dirt. Old equipment was often designed without environmental considerations in mind. Common problems are dust, spider webs, liquid damage or residue, and labels. Cleaning however should not be done for the sake of it as it may cause long-term damage.

Here is a summary of some of the more common problems and their quick-fix remedies:

- *Stickiness, crayon and grease*: use `Touch of Oranges Adhesive Remover', `Goo-Gone' or `3M GP'. Isopropyl alcohol also works well.

- *Discolouration/coffee stains:* use `Purple Stuff', `Fulcron' or any antistatic foam cleaner. Isopropyl alcohol works well.

- *Ink marks:* use `Cameo Copper Cleaner'

- *Old label removal:* label removers commonly obtained in electrical stores can clean the sticky residue left by previous labels. Sticky stuff" by Betterware is one such product.

- *Dust removal:* VHS video cleaning kits with miniature vacuum cleaners and also air sprays are not that effective. A clean paintbrush often works much better. Anti-Static sprays stops the attraction of airborne dust and can be used safely on television screens, monitors, cabinets and fluorescent lights. Note – do not use on vinyl records as it can leave traces of solution on them. For records – clean with isopropyl alcohol instead. A can of compressed

air also works well in removing dust and dirt from the insides of electrical equipment.

- *Dirt in between/on keyboard keys:* Paintbrush or cotton swabs dipped in foam cleaner or isopropyl alcohol. If you can completely remove the keys, they can be soaked in warm soapy water (if there are no electrical parts attached obviously!). In really bad cases you could try acetone but try this in a hidden area first to make sure the plastic doesn't react badly to it.

- *General surface cleaning:* `Formula 409', `Fantastik', glass cleaner or a weak ammonia solution

- *Dirt in the cracks/joins on cases and in other inaccessible areas:* use an orange-peeling tool (this looks like a toothbrush without bristles and is flat like a screwdriver on one end). It is great for scraping out the seams and grooves without causing damage to the surrounding plastic. A can of compressed air with extension tube is good for loosening dirt from delicate or inaccessible electrical equipment.

- *Cleaning the plastic cases of calculators/computers/games etc:* Vinyl cleaners (also used for cleaning car interiors) are good. Never use petroleum based chemicals on styrene/soft plastic but rather used oil-based cleaners. Polish with 600-grit sandpaper then buff with white toothpaste (whitening or smokers' toothpaste is good) then use a small amount of silicone type car wax. Lighter fluid (butane), acetone – such as nail polish remover - (but test a small area first as it may not work well on plastic), or foam cleaner e.g. Servisol can also be used. Novus Plastic polish can be used to remove scuffs and tobacco stains, but don't use on paint as it's quite abrasive.

- *Battery leakage:* use a solution of baking soda and water - about 2 tablespoons to 8 ounces of water. Generously moisten a lint free cloth with the solution and wipe/blot the surface of the component, and wipe/blot with a dry cloth.

- *Dirt on gold contacts/around edge of monitors:* a pencil eraser or 1000 grit sandpaper can be used.

- *Rust/corrosion:* protective lubricants obtained in shops can displace moisture and removes rust from nuts and bolts.

- *Monitors:* spray screen cleaner onto a clean lint free cloth as opposed to directly on the screen and. Cloth is better than paper towels or tissue.

Your general cleaning toolkit should consist of the following basics:

- cotton swabs ('q-tips')
- anti-static spray
- can of compressed air with extension tube.
- Isopropyl alcohol – which can be used on tape heads, disc drives, turntables, PCBs and other instruments and delicate components. It is safe on plastics and evaporates quickly.
- Dry wipes or lint free cloth
- Multipurpose anti-static foam cleaner
- Pencil eraser
- Paintbrush ■

Charles Babbage Institute, Minnesota, USA

The Charles Babbage Institute (also titled the Center for the History of Information Technology) is a research center at the University of Minnesota specializing in the history of information technology, particularly the history since 1935 of digital computing, programming/software, and computer networking.

In addition to holding important historical archives, in paper and electronic form, its staff of historians and archivists are dedicated to conducting and publishing historical and archival research and promoting the study of the history of information technology internationally. CBI archivists collect, preserve, and make available for research primary source materials relating to the history of information technology. The archival collection consists of corporate records, manuscript materials, records of professional associations, oral history interviews, trade publications, periodicals, obsolete manuals and product literature, photographs, films, videos, and reference materials.

CBI also serves as a clearinghouse for resources on the history of information technology. Some of the current research includes studying Moore's Law and the history of NSF FastLane.

The CBI is also home to the historical archives of the Burroughs Corporation, once the nation's largest manufacturer of adding machines and, later, a major computer company. The collection includes over 100,000 photographs depicting the entire visual history of Burroughs

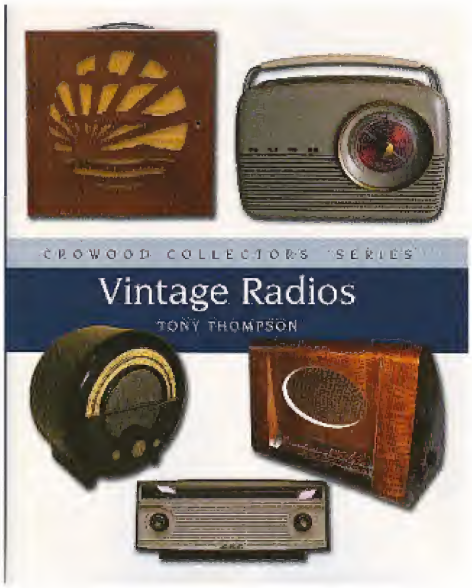
Visit: http://www.cbi.umn.edu/ for more information or go see them at: Charles Babbage Institute, 211 Andersen Library, 222 - 21st Avenue South, University of Minnesota, Minneapolis, MN 55455. ■

Collection of vintage electronic musical toys

This is a great online collection of rare musical toys and gadgets from the 1960s onwards. For those who think it's just a bunch of Casio keyboards – think again and you will be pleasantly surprised at some of these gems.
Eric, based in Germany, started collecting musical toys after he started hunting around for a Concept 2000 electronic organ he had as a child. Along the way he discovered an array of musical oddities, most of which are very rare as they were not very popular at the time. Sound quality was often poor and as such these toys were short lived. Some of the highlights worth a mention include the oldest machine in the collection – a 1954 Nucleonic Electronovox, which had to be played and listened to near a radio, as it had no loudspeaker.
There is also a classic 1968 Rolf Harris Stylophone, a Tomy Voice Corder from 1972 which could play and record onto records, an Ohio Art Sketch-A-Tune from 1975 which generated buzzing sounds as a pencil drawing was made on a pre-drawn field, a 1978 Mego Muson Synthesizer which was a mini sequencer with endless possibilities, an MBO Wristwatch Organ from 1983 and a Texas Instruments Speak & Music from 1985.
Visit: http://www.miniorgan.com/index.html ■

Vintage Radios

by Tony Thompson



This collector's companion takes the reader through the history of the radio set and its importance in people's lives. In the thirties and forties the wireless was an essential aspect of home life and a potent symbol of status. Beautifully made floor-standing and table-top sets in veneered wood and trendy bakelite became the focal points of living rooms up and down the land. Radios in the 1950's and 60's are also described. Looking at today's antiques, this overview discusses important makes and models, the story behind some famous names, buying and selling, care and restoration, foreign radios, and radio-related ephemera.

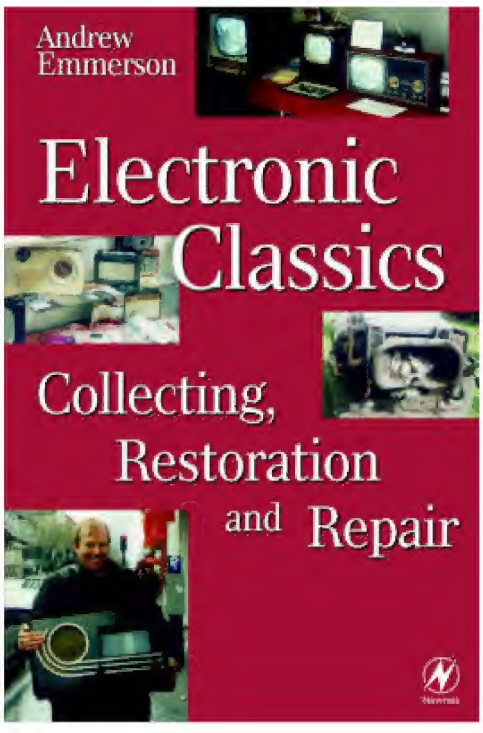
Tony Thompson is a former teacher who has been interested in radios all his life. He collects, repairs and services vintage sets, many hundreds of which have passed through his hands. He runs his own vintage radio website and is the author of two books on the subject.

This is a useful book to the hobbyist who is new to this subject. The photos are of a high quality and provide a valuable reference.

Hardcover; Published by Crowood Press; Price: $37.96 on Amazon. ■

Electronic Classics: Collecting, Restoring and Repair

by Andrew Emmerson



Vintage Radio, Television and Hi-Fi are highly popular 'modern antiques' - and offer the added challenge for restorers of the repair of classic valve-based circuits. This highly readable book encompasses all aspects of buying, collecting, restoring, repairing, sourcing parts, professional services, clubs and societies, etc. Covering the technical side as well as collecting, this book offers the most comprehensive coverage available.

The first half of the book deals primarily with technical aspects of restoration, what components are needed and where they can be found. The second half of the book provides a wealth of useful information: names and addresses of clubs and societies, auctions and antique fairs; a professional services directory; how to get hold of service data. Armed with this book the enthusiast will be able to tackle the restoration of a vintage machine with confidence.

It covers technical aspects of classic valve-based circuitry. This is the most complete work for vintage audio and TV enthusiasts, dealers and repairers.

This book is likely to be more useful to a beginner however. The illustrations and layout is poor and the internet references are likely to become outdated.

Paperback; price: £24.69 on Amazon; 400 pages, published by Newnes. ■

Computer time sharing memories

By Jeremy J. S. B. Hall

"On January 26th 1967 in the middle of winter in New England I was dragged screaming and kicking into the computer age. I was just completing GE's Manufacturing Management Program (for graduates) and had just spent two days trying to find a relationship explaining why Power Transformers failed the radio noise test on final inspection. My boss called me over and suggested that I use the new computer time-sharing terminal in the high voltage lab.

So, clutching a telephone number (for the computer) and a user number (to allow access) I walked in trepidation to use the computer time-sharing system. I dialed and following a high-pitched scream (the computer responding rather than me) pressed the online button. The computer responded and asked me my user name that I entered - I was online! Next I called up one of the library programs - SIXCUR$ - to do the necessary calculations. A few minutes later and after eleven seconds of processor time the calculations were complete! It had done MORE work than I had done in the previous TWO days. And, I had survived my first encounter.

A few weeks later, I finished the GE program and moved on to work on developing a computerised manufacturing system. My first task was to design a short-term forecasting system. The only way I could see to do this was to try out different approaches on real sales data - a huge computational task! Happily, the GE business that I was now working for also had GE's Mark 1 time-sharing. And so, over the next six weeks, I taught myself to program in BASIC and had developed the forecasting system. I also had blown the whole annual budget for time-sharing (about $400).

By the end of the summer I had my own time-sharing terminal by my desk. Also, during that time I estimated that I had saved myself *five man-years* of time.

The main reason that I had my own terminal was that facing a two year wait for the in-house computerised manufacturing system to be completed, my boss's boss's boss asked whether it would be possible to develop an interim system on the time-sharing system. (In case " boss's boss's boss" is confusing, I meant that the guy who asked the question was at the top of the organisation - three levels up).

Although the interim system only managed a few of the materials these were the key ones and so had a major impact on the business. Each month, the current inventory and schedule was punched as data statements off-line onto paper tape. Next the computer was dialled and the program loaded (from paper tape). Then the inventory and schedule tapes were loaded. The program was run and the schedule printed out (at 10 characters a second). Finally, a series of paper tapes were punched to be used to Telex suppliers the new schedules (remember the terminal was a standard Telex machine and so fully compatible). Not bad for August/September 1967!

Unfortunately, it soon became apparent that the scheduling logic was flawed and we were just not reducing inventory levels as forecast. This produced lengthy discussions about the scheduling logic. Ultimately (spring 1968), it was decided that the only way to resolve the issue was to create a computerised model of the supply chain and simulate. This was done. The model was developed in BASIC and run many times to test out different assumptions and lead to a change to the scheduling logic. (A paper on this work was presented in the UK in the early 1970s and published in the US in 1975 - see reference.)

My work in manufacturing was being noted in the other functions and led to the accounts department coming to me to see if they could speed up their monthly budgetary reporting process. After a few days we had a budget model up and running. Also, the monthly use of the computer could be done by a junior staff member rather than a senior accountant (as previously). Finally, the time saving gave time for everyone to come up with excuses before the budget meeting!

That January afternoon in 1967 changed my life. I was such an enthusiast for computer time-sharing that I changed my career and moved back to the UK to work for the GE subsidiary selling their time-sharing service. My role was to market the use of the service for business planning and reporting. As part of that work I launched the first interactive modelling package and developed my first business simulation for managerial learning in 1970." ■

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What:
2008 Texas Pinball Festival

Date:
March 14th —16th, 2008

Hours:
March 14th: 5pm - 2am
March 15th: 10am - 2am
March 16th: 9am - 2:30pm

Where:
Hilton DFW Lakes
Executive Conference Center
1800 Highway 26 East
Grapevine, Texas, 76051-9641 (Located next to Grapevine Mills Mall & Bass Pro Shops)

Price:
One Day Admission (Friday / Saturday): $15 Adults, $8 for Children (Ages 5-12)
One Day Admission (Sunday): $7 Adults, $5 for Children (Ages 5-12)
Weekend Pass: $30 Adults, $20 for Children (Ages 5-12)

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(214) 632-5537 & www.texaspinball.com

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